SLAG ANALYSIS
CARBON ALLOY SYNTHESIS PROCESS AREA

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This report provides a summary of the laboratory analytical data of the slag proposed for use as a cover at the Carbon Alloy Synthesis Process (CASP) area at the U. S. Steel Gary Works facility in Gary, Indiana (Facility). This analysis was conducted to meet Condition 7 as stated in the *Conditions of Approval for the Interim Stabilization Measure Workplan*, issued by the U.S. Environmental Protection Agency (USEPA) on July 20, 2010.

1.0 OBJECTIVES

The sampling and analysis of the slag was conducted to demonstrate the slag cover that will be used at the CASP area as part of the interim measures for ELA1 will not pose any adverse impacts to human health and the environment.

2.0 METHODOLOGY

Thirteen slag samples (12 environmental samples and one field duplicate sample) were collected on July 21, 2010 from three piles of blast furnace slag staged at the Facility. The slag material conforms to Indiana No. 53 in the Standard Specifications which is the same material that will be used as cover at the CASP area.

Collected slag samples were sent to Test America Laboratory's facility in North Canton, Ohio for analysis using the analytical methods tabulated below.

	Extraction Procedures and Analytical Methods	
	Total Analysis	**Synthetic Precipitation Leaching Procedures (SPLP) Analysis**
Appendix IX target list volatile organic compounds (VOCs)	SW846 8260B	SW846/1312 8260B
Appendix IX target list of semi-volatile organic compounds (SVOCs)	SW846 8270C	SW846/1312 8270C
Appendix IX total metals	SW846 6010B	SW846/1312 6010B
Hexavalent chromium	SW846 7196A	SW846/1312 7196A
Lithium	SW846 6010B	SW846/1312 6010B
Appendix IX target list of polychlorinated biphenyls (PCBs)	SW846 8082	SW846/1312 8082

3.0 LABORATORY RESULTS

This section presents a comparison of the laboratory analytical results of slag samples to the same risk-based screening criteria that were used in the *Addendum to the East Side RCRA Facility Investigation Report* (USS, June 2010) as described below. The Data

Validation Reports and Laboratory Reports are presented in **Attachment A** and **Attachment B**, respectively.

Screening Criteria for Total Analysis Data

- USEPA's Regional Screening Levels (RSLs) – RSLs (USEPA, December 2009) for Industrial Soil (at a noncancer hazard index [HI] of 1 and an adjusted cancer risk [CR] of 1E-05 or 1E-04) were used in the evaluation of slag data. USEPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (USEPA, 2004), if available, were used for chemicals lacking RSLs.

- Construction Worker Screening Values (CWSVs) -- The CWSVs are the Indiana Department of Environmental Management's (IDEM's) Construction Worker Default Closure Level (DCL) (IDEM, 2009) or values derived using the methodology established by IDEM for chemicals lacking construction worker DCLs.

- Site-specific soil screening levels (SSLs), derived based on soil physical and hydrogeological data collected at the Facility and fraction organic content (foc) data collected from the ELA1 were used in the *East Side RCRA Facility Investigation Report* (USS, June 2010) as a conservative screening tool to evaluate the potential for chemicals in soil to migrate to groundwater. The analytical data of slag were not compared to SSLs because SPLP analytical data, a conservative method for evaluating the migration potential for chemicals in soil, are available for evaluation.

Screening Criteria for SPLP Analysis data

Criteria used in the evaluation of SPLP data include the federal Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act (as presented on the RSL tables [USEPA, 2009]) and RSLs for tapwater for chemicals lacking federal MCLs.

3.1 Total Analysis

Presented below is a brief summary of the results of total analysis as presented in **Table 1.**

- None of the analytes were detected at levels exceeding the Industrial Soil RSLs at a CR of 1E-04 or 1E-05 and an HI of 1. The reporting limits (RLs) for nondetected analytes were all below the RSLs.

- None of the analytes were detected at levels exceeding the CWSVs. The RLs for nondetected analytes were all below the RSLs.

3.2 SPLP Analysis

Presented below is a brief summary of the results of SPLP analysis as presented in **Table 2.**

- None of the Appendix IX target list SVOCs and metals was detected at levels exceeding the groundwater screening criteria used in the data evaluation; i.e., MCLs or RSLs for tapwater (for chemicals lacking MCLs). The RLs for several SVOCs exceeded their screening criteria. The RLs for three metals (antimony, beryllium, and thallium) exceeded the groundwater screening criteria based on MCLs. However, the RLs for antimony and beryllium were below the RSLs for tapwater.

- Hexavalent chromium was not detected in all 13 samples and the RL of 0.02 milligram per liter (µg/L) was below the screening criterion of 0.043 µg/L (based on the RSL for tapwater).

- Lithium was not detected in all 13 samples and the RLs were all below the screening criterion of 73 µg/L (based on the RSL for tapwater).

- PCBs were not detected in all 13 samples. Although the RL of 0.38 µg/L for six of the Aroclors exceeded the screening criteria (ranging from 0.0068 µg/L to 0.034 µg/L), the RL reported in this analysis is consistent with the RL of 0.4 µg/L established in the *Quality Assurance Project Plan* (QAPP) for the Corrective Action activities at the Facility.

- Four VOCs (carbon disulfide, ethybenzene, toluene, and xylenes) were detected and all of the detected concentrations were below the screening criteria. In addition, 15 VOCs were not detected, but the RLs were above the screening criteria.

4.0 CONCLUSIONS

As indicated by the data presented in **Table 1** and **Table 2,** the results of the slag sampling and analysis indicate that:

- The slag material that will be placed at the CASP area will not pose any adverse impacts to human health because all of the chemicals detected in slag samples were reported at levels below risk-based concentrations used in the data evaluation process; i.e., RSLs for the industrial workers and CWSVs for construction workers.

- The slag material will not pose any adverse impacts to the environment. The SPLP analytical data indicate that chemicals in slag are not likely to serve as a secondary source of impact to groundwater via leaching.

In conclusion, the results of this sampling and analysis demonstrate that the slag cover that will be placed at the CASP area will not pose any adverse impacts to human health and the environment.